

PATENT COOPERATION TREATY

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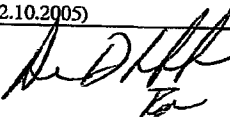
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 27 OCT 2005

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Applicant's or agent's file reference VM7031426002		FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/US04/28756		International filing date (day/month/year) 03 September 2004 (03.09.2004)	Priority date (day/month/year) 05 September 2003 (05.09.2003)	
International Patent Classification (IPC) or national classification and IPC IPC(7): G06K 9/00 and US Cl.: 382/128- 134; 378/08,65,95				
Applicant VARIAN MEDICAL SYSTEMS TECHNOLOGIES, INC.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of ___ sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 24 June 2005 (24.06.2005)		Date of completion of this report 02 October 2005 (02.10.2005)		
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22131-1450 Facsimile No. (703) 305-3230		Authorized officer Chawan Sheela  Telephone No. (571) 272-7446		

Form PCT/IPEA/409 (cover sheet)(January 2004)

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☒ the international application as originally filed/furnished

☒ the description:

pages 1-25 as originally filed/furnished

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☒ the claims:

pages 25-32 as originally filed/furnished

pages* NONE as amended (together with any statement) under Article 19

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☒ the drawings:

pages 1-11 as originally filed/furnished

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

☒ the description, pages NONE

☒ the claims, Nos. NONE

☒ the drawings, sheets/figs NONE

☒ the sequence listing (*specify*): NONE

☒ any table(s) related to the sequence listing (*specify*): NONE

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

** If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/28756**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)

Claims 3-20,26-30,35-39,41-49,51,52 and 54-56 YESClaims 1,2,22,23,31,32,40,50 and 53 NO

Inventive Step (IS)

Claims 18-20, 46-47 YESClaims 1-17,21,22-39, 40- 45, 48 and 49, 50-56 NO

Industrial Applicability (IA)

Claims 1-56 YESClaims NONE NO**2. Citations and Explanations (Rule 70.7)**
Please See Continuation Sheet

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Claims 1, 2, 22, 23, 31, 32, 40, 50 and 53 lack novelty under PCT Article 33(2) as being anticipated by Hounsfield (US.3,952,201).

As to claim 1, Hounsfield discloses a method of determining a position of a target region in a medical procedure (abstract, column line 25 - 33), comprising:

acquiring an input image of a target region (note, acquiring image based on radiation source such as X- or Y radiation by monitoring the motion of the heart body by producing motion signal (column 1, lines 53- 68, column 2, lines 1-5);

enhancing a feature of the input image (note, CT scanner comprising an X-ray source 2 and detectors 6 mounting on a rotating gantry 7 drive by motor 8, e.c.g. monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 66 through column 4, line 11 describe an embodiment in which image data is correlated with motion data so as to selector the image data that falls within prescribed regions of the cardiac cycle);

registering the input image with a template (column 2, lines 40-68, column 3, lines 1-49, column 3, line 62 through column 4, line 11); and

determining a position of the target region in the input image based on the registering (note, fig 2 an electrocardiogram (e.c.g.) monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 6 through column 4, line 11).

As to claim 22, see the rejection of claim 1 above.

As to claim 31, see the rejection of claim 1 above.

As to claim 40, see the rejection of claim 1 above.

As to claim 50, see the rejection of claim 1 above.

As to claim 53, see the rejection of claim 1 above.

As to claims 2, 23 and 32 Hounsfield discloses the method, wherein the enhancing comprises determining a composite image of previously acquired input images (column 3, lines 35- 49).

Claims 3 -6, 13 -17, 26- 30, 35- 39, 41- 45, 48-49, 51, 52, 54-56 lack inventive step under PCT Article 33(3) as being unpatentable over Hounsfield (US.3,952,201) in view of Hsieh et al., (US.5,271,055).

Regarding claim 3, Hounsfield discloses a method of examining a living body by means of penetrating radiation, such as X- or gamma, radiation, and monitoring the motion of the heart of said body and providing motion signals indicative of said motion. Hounsfield is silent about determining a composite image comprises performing an image averaging on the previously acquired input images.

Hsieh discloses methods for reducing motion induced artifacts in a projection imaging system. The system comprises

Supplemental Box

of :

determining a composite image comprises performing an image averaging on the previously acquired input images (column 7, lines 10-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hounsfield to include determining a composite image comprises performing an image averaging on the previously acquired input images. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hounsfield by the teaching of Hsieh in order to provide a prediction technique in which aberrations in the physiological activity will have minimal effect on accuracy of the predication (as suggested by Hsieh at column 3, lines 28-30).

As to claim 4, Hsieh discloses the method, wherein the enhancing further comprises subtracting the composite image from the input image (column 8, lines 21-37).

As to claim 5, Hsieh discloses the method, wherein the image averaging is performed using a boxcar averaging technique (column 7, lines 10-20).

As to claim 6, Hsieh discloses the method, wherein the image averaging is performed based on a weighted average (column 7, lines 1-20).

As to claims 7, 24 and 33 Hsieh discloses the method, further comprising selecting the template from a plurality of templates (column 8, lines 20-59).

As to claims 8, 25 and 34 Hsieh discloses the method, wherein the selecting comprises choosing a template from the plurality of templates that best matches at least a portion of the input image (column 8, lines 20-59).

As to claim 9, Hsieh discloses the method, wherein the selecting comprises:

comparing the input image with at least a subset of the templates (fig 4B); and

selecting the template that best matches at least a portion of the input image (column 8, lines 21-41)

As to claim 10, Hsieh discloses the method, wherein the selecting comprises comparing the input image with the template that is generated at approximately a same time-point or a same phase of a physiological cycle as the input image (abstract, column 2, lines 45-68, column 3, lines 1-30).

As to claim 12, Hsieh discloses the method, wherein the determining a position of the target region comprises determining a position of the image in the input image that best matches the template (abstract, column 2, lines 45-68, column 3, lines 1-30).

As to claims 13, 26, 35 and 48, Hounsfield discloses the method, wherein the input image comprises a fluoroscopic image (note an instrument used for observing the internal structural of the living body by means of X-rays, corresponds to fluoroscopic image, column 1, lines 53-68, column 2, lines 1-2).

As to claims 14, 27 and 36, Hounsfield discloses the method, further comprising performing a medical procedure based on the determined position of the target region (note, target region corresponds to monitoring the motion of the heart and providing motion signals indicative of motion, column 2, lines 3-8).

As to claims 15, 28 and 37, Hounsfield discloses the method, wherein the medical procedure comprises directing a radiation beam to an object (note, detecting the radiation emergent from the body region corresponds to monitoring the motion of the heart and providing motion signals indicative of motion, column 2, lines 3-19).

As to claims 16, 29 and 38, Hounsfield discloses the method, wherein the performing the medical procedure comprises changing a direction of a radiation beam in response to the determined position (column 3, lines 35-49).

As to claims 17, 30 and 39, Hounsfield discloses the method, wherein the performing the medical procedure comprises gating a delivery of the radiation beam in response to the determined position (note, CT scanner comprising an X-ray source 2 and detectors 6 mounting on a rotating gantry 7 drive by motor 8, e.g. monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 66 through column 4, line 11).

As to claims 41, 51, 54 and 55, Hsieh discloses the method, further comprising determining a first value associated with a contrast (column 1, lines 13-38, 57-66, column 4, lines 11-25) of the first difference image (column 1, lines 13-38, 57-66, column 4, lines 11-25, 52 through column 5, line 68, column 8, lines 20-41).

As to claim 42, Hsieh discloses the method, wherein the determining whether the object has moved is performed based on the first value (column 4, line 52 through column 5, line 68).

As to claim 43, Hsieh discloses the method, further comprising:

acquiring a second image of the object (fig 4A, column 5, lines 12-68);

determining a composite image based on the second image and the reference image (column 6, lines 4-59); and

determining whether the object has moved based at least on the second

composite image (fig 4B, column 5, lines 57-68).

As to claim 44, Hsieh discloses the method, further comprising determining a second value associated with a contrast of the second composite image (abstract, column 8, lines 10-68).

As to claim 45, Hsieh discloses the method, wherein the determining whether the object has moved is performed based on the second value (column 8, lines 10-68).

As to claims 49, 52 and 56 Hounsfield discloses the method, further comprising enhancing a moving object in the first image (note, CT scanner comprising an X-ray source 2 and detectors 6 mounting on a rotating gantry 7 drive by motor 8, e.g. monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 66 through column 4, line 11).

Claims 18-20 and 46-47 meet the criteria set out in PCT Article 33(2)(4), because the prior art does not teach or fairly suggest the

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International application No.
PCT/US04/28756

Supplemental Box

limitation wherein the target region comprises at least a part of an animal body, a lung tissue or a heart tissue and comprises a bone.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 17 MAR 2005

WIPO PCT

To:
PETER C. MEI
BINGHAM MCCUTCHEN LLP
THREE EMBARCADERO CENTER, SUITE 1800
SAN FRANCISCO, CA 94111-4067

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year) 15 MAR 2005	
Applicant's or agent's file reference VM7031426002	
FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US04/28756	International filing date (day/month/year) 03 September 2004 (03.09.2004)
Priority date (day/month/year) 05 September 2003 (05.09.2003)	
International Patent Classification (IPC) or both national classification and IPC IPC(7): G06K 9/00 and US CL.: 382/128- 134; 378/08,65,95	
Applicant VARIAN MEDICAL SYSTEMS TECHNOLOGIES, INC.	

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Sheela Chawan Telephone No. 703-305- 4876
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US04/28756

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ in written format

☐ in computer readable form

c. time of filing/furnishing

☐ contained in international application as filed.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US04/28756

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>3-20, 26-30, 35-39, 41-49, 51, 52 and 54-56</u>	YES
	Claims <u>1, 2, 22, 23, 31, 32, 40, 50 and 53</u>	NO
Inventive step (IS)	Claims <u>18-20, 46-47</u>	YES
	Claims <u>1-17, 21, 22-39, 40-45, 48 and 49, 50-56</u>	NO
Industrial applicability (IA)	Claims <u>1-56</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US04/28756

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1, 2, 22, 23, 31, 32, 40, 50 and 53 lack novelty under PCT Article 33(2) as being anticipated by Hounsfield (US.3,952,201).

As to claims 1, 22, 31, 40, 50, 53, Hounsfield discloses a method of determining a position of a target region in a medical procedure (abstract, column line 25 - 33), comprising:

acquiring an input image of a target region (note, acquiring image based on radiation source such as X- or Y radiation by monitoring the motion of the heart body by producing motion signal (column 1, lines 53- 68, column 2, lines 1-5);
enhancing a feature of the input image (note, CT scanner comprising an X-ray source 2 and detectors 6 mounting on a rotating gantry 7 drive by motor 8, e.c.g. monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 66 through column 4, line 11 describe an embodiment in which image data is correlated with motion data so as to selector the image data that falls within prescribed regions of the cardiac cycle);
registering the input image with a template (column 2, lines 40-68, column 3, lines 1-49, column 3, line 62 through column 4, line 11); and

determining a position of the target region in the input image based on the registering (note, fig 2 an electrocardiogram (e.c.g.) monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 6 through column 4, line 11).

As to claims 2, 23 and 32 Hounsfield discloses the method, wherein the enhancing comprises determining a composite image of previously acquired input images (column 3, lines 35- 49).

Claims 3 -6, 13 -17, 26- 30, 35- 39, 41- 45, 48-49, 51, 52, 54-56 lack inventive step under PCT Article 33(3) as being unpatentable over Hounsfield (US.3,952,201) in view of Hsieh et al., (US.5,271,055).

Regarding claim 3, Hounsfield discloses a method of examining a living body by means of penetrating radiation, such as X- or gamma, radiation, and monitoring the motion of the heart of said body and providing motion signals indicative of said motion. Hounsfield is silent about determining a composite image comprises performing an image averaging on the previously acquired input images.

Hsieh discloses methods for reducing motion induced artifacts in a projection imaging system. The system comprises of:
determining a composite image comprises performing an image averaging on the previously acquired input images (column 7, lines 10- 20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hounsfield to include determining a composite image comprises performing an image averaging on the previously acquired input images. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hounsfield by the teaching of Hsieh in order to provide a prediction technique in which aberrations in the physiological activity will have minimal effect on accuracy of the predication (as suggested by Hsieh at column 3, lines 28- 30).

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US04/28756

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

As to claim 4, Hsieh discloses the method, wherein the enhancing further comprises subtracting the composite image from the input image (column 8, lines 21- 37).

As to claim 5, Hsieh discloses the method, wherein the image averaging is performed using a boxcar averaging technique (column 7, lines 10- 20).

As to claim 6, Hsieh discloses the method, wherein the image averaging is performed based on a weighted average (column 7, lines 1-20).

As to claims 7, 24 and 33 Hsieh discloses the method, further comprising selecting the template from a plurality of templates (column 8, lines 20- 59).

As to claims 8, 25 and 34 Hsieh discloses the method, wherein the selecting comprises choosing a template from the plurality of templates that best matches at least a portion of the input image (column 8, lines 20- 59).

As to claim 9, Hsieh discloses the method, wherein the selecting comprises:

comparing the input image with at least a subset of the templates (fig 4B); and

selecting the template that best matches at least a portion of the input image (column 8, lines 21- 41)

As to claim 10, Hsieh discloses the method, wherein the selecting comprises comparing the input image with the template that is generated at approximately a same time-point or a same phase of a physiological cycle as the input image (abstract, column 2, lines 45- 68, column 3, lines 1- 30).

As to claim 12, Hsieh discloses the method, wherein the determining a position of the target region comprises determining a position of the image in the input image that best matches the template (abstract, column 2, lines 45- 68, column 3, lines 1- 30).

As to claims 13, 26, 35 and 48, Hounsfield discloses the method, wherein the input image comprises a fluoroscopic image (note an instrument used for observing the internal structural of the living body by means of X-rays, corresponds to fluoroscopic image, column 1, lines 53 - 68, column 2, lines 1-2).

As to claims 14, 27 and 36, Hounsfield discloses the method, further comprising performing a medical procedure based on the determined position of the target region (note, target region corresponds to monitoring the motion of the heart and providing motion signals indicative of motion, column 2, lines 3 - 8).

As to claims 15, 28 and 37, Hounsfield discloses the method, wherein the medical procedure comprises directing a radiation beam to an object (note, detecting the radiation emergent from the body region corresponds to monitoring the motion of the heart and providing motion signals indicative of motion, column 2, lines 3 - 19).

As to claims 16, 29 and 38, Hounsfield discloses the method, wherein the performing the medical procedure comprises changing a direction of a radiation beam in response to the determined position (column 3, lines 35- 49).

As to claims 17, 30 and 39, Hounsfield discloses the method, wherein the performing the medical procedure comprises gating a delivery of the radiation beam in response to the determined position (note, CT scanner comprising an X-ray source 2 and detectors 6 mounting on a rotating gantry 7 drive by motor 8, e.c.g. monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 66 through column 4, line 11).

As to claims 41, 51, 54 and 55, Hsieh discloses the method, further comprising determining a first value associated with a contrast (column 1, lines 13-38, 57- 66, column 4, lines 11-25) of the first difference image (column 1, lines 13-38, 57- 66, column 4, lines 11-25, 52 through column 5, line 68, column 8, lines 20 - 41).

As to claim 42, Hsieh discloses the method, wherein the determining whether the object has moved is performed based on the first value (column 4, line 52 through column 5, line 68).

As to claim 43, Hsieh discloses the method, further comprising:

acquiring a second image of the object (fig 4A, column 5, lines 12- 68);

determining a composite image based on the second image and the reference image (column 6, lines 4- 59); and

determining whether the object has moved based at least on the second composite image (fig 4B, column 5, lines 57- 68).

As to claim 44, Hsieh discloses the method, further comprising determining a second value associated with a contrast of the second composite image (abstract, column 8, lines 10-68).

As to claim 45, Hsieh discloses the method, wherein the determining whether the object has moved is performed based on the second value (column 8, lines 10-68).

As to claims 49, 52 and 56 Hounsfield discloses the method, further comprising enhancing a moving object in the first image (note, CT scanner comprising an X-ray source 2 and detectors 6 mounting on a rotating gantry 7 drive by motor 8, e.c.g. monitors 10 and speed control 12 for adjusting the two starts in the heart cycle that case gating the source on and off are movement above the designated threshold and movement below the threshold of the beginning and ending of specific phases of the movement, column 3, line 66 through column 4, line 11).

Claims 18-20 and 46 - 47 meet the criteria set out in PCT Article 33(2)(4), because the prior art does not teach or fairly suggest the limitation wherein the target region comprises at least a part of an animal body, a lung tissue or a heart tissue and comprises a bone.